## INSTALLATION GUIDE AND TERMINAL BLOCK SPECIFICATIONS

# NI SC Express 4330/4331

Français Deutsch 日本語 한국어 简体中文

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NI SC Express is a family of PXI Express modules with integrated data acquisition and signal conditioning. These devices offer increased speed, accuracy, and synchronization features that are well suited for high-density sensor measurement and signal-conditioning systems. Accessories required for signal connections to these modules include a front-mount terminal block with screw-terminal connectivity.

This guide describes how to install and configure the NI SC Express PXIe-4330/4331 module and terminal board, connect signals, and verify that the system is working properly. Current versions of NI documents are available at `ni.com/manuals`.

The NI PXIe-4330/4331 provides eight simultaneously sampled input channels for interfacing to strain-gage bridges and other Wheatstone-bridge based sensors. This guide describes how to install and use the TB-4330 terminal block with a NI PXIe-4330/4331 module. This terminal block is designed for use with the following module:

NI PXIe-4330/4331

The keying of this terminal block prevents it from connecting to other modules that could be damaged by the voltage present on the terminal block. However, you should only use this terminal block with its supported modules.

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## What You Need to Get Started

To set up and use the TB-4330 terminal block, you need the following items:

- ❑ Hardware
  - TB-4330 terminal block
  - NI PXIe-4330/4331 module
  - NI PXIe chassis
  - Cabling and sensors as required for your application
- ❑ Tools
  - Number 1 and 2 Phillips-head screwdrivers
  - 1/8 in. flathead screwdriver
  - Long-nose pliers
  - Wire cutter
  - Wire insulation stripper
- ❑ Documentation
  - *NI SC Express 4330/4331 Installation Guide and Terminal Block Specifications*
  - *Read Me First: Safety and Electromagnetic Compatibility*
  - *NI PXIe-4330/4331 User Manual*
  - NI PXIe chassis user manual

You can download needed documents from `ni.com/manuals`.

# Installation

## Step 1. Install the Software

**Note** You must be an administrator to install NI software and devices on your computer.

Before installing the NI SC Express hardware, make sure the following are installed in the order indicated:

1. Your application software, such as LabVIEW, LabWindows™/CVI™ or .NET
2. NI-DAQmx 9.1 or later

**Note** When installing NI application software, such as NI LabVIEW, refer to the *NI-DAQmx Readme* on the software disc for supported software versions. Back up any applications before upgrading software or modifying the application.

**Tip** Using an NI-DAQmx simulated device, you can test NI-DAQmx applications without installing hardware. Refer to the *Create a Simulated Device* section for instructions for creating NI-DAQmx simulated devices.

## Step 2. Unpack and Install the Module

Remove the packaging and inspect the module. Contact NI if the module is damaged. Do not install a damaged module.

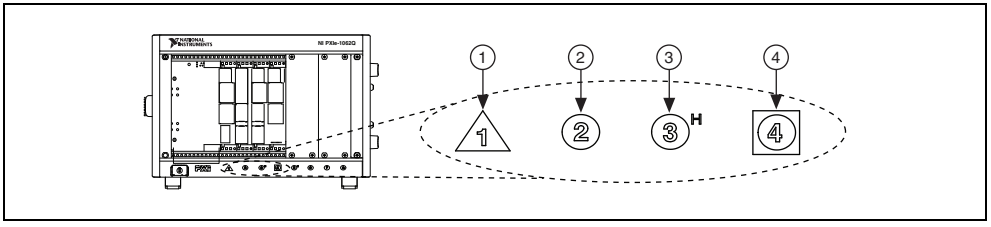
**Caution** The module is static sensitive. Always properly ground yourself and the equipment when handling or connecting to the module.

Complete the following steps to install the NI SC Express module while referring to Figures 1 and 2:

1. Power off the NI PXI Express chassis. Refer to the chassis manual for chassis installation and configuration instructions.

**Caution** Refer to the *Read Me First: Safety and Electromagnetic Compatibility*, included with your module, before connecting or disconnecting signal wires.

2. Identify a supported PXI Express slot in the chassis. NI SC Express devices can be placed only in PXI Express Peripheral slots, PXI Express Hybrid Peripheral slots, and PXI Express System Timing slots. Refer to the chassis documentation for details.



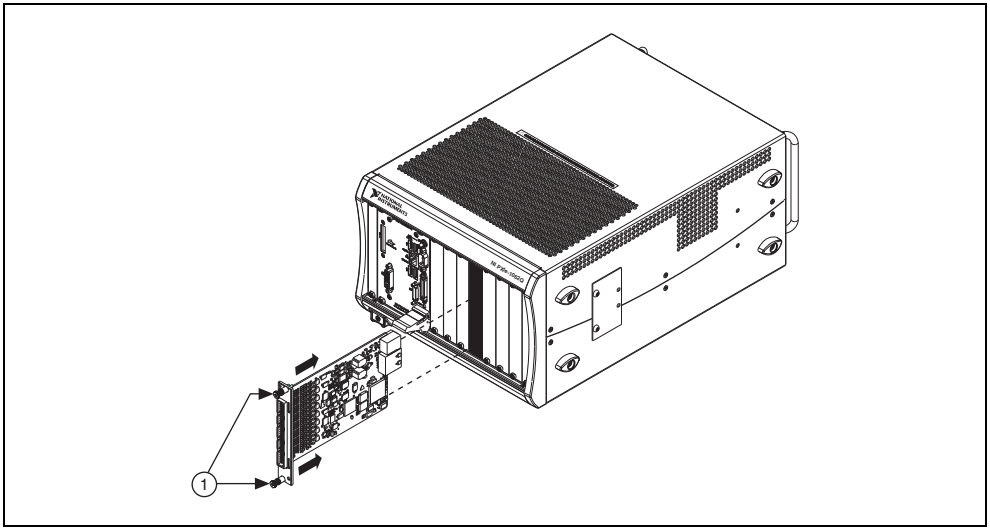

| | | | |
|---|---|---|---|
| 1 | PXI Express System Controller Slot | 3 | PXI Express Hybrid Peripheral Slot |
| 2 | PXI Peripheral Slot | 4 | PXI Express System Timing Slot |

**Figure 1.** Symbols for PXI Express/ PXI Express Hybrid/ PXI Slots

3. Remove the filler panel, and touch any metal part of the chassis to discharge static electricity.
4. Place the module edges into the module guides at the top and bottom of the slot.

**Caution** When installing the module, make sure both edges are positioned inside the guides and that the module components do not come into contact with adjacent modules.

5. Slide the module along the guides until it reaches the rear connector then seat the module by pushing the front panel until it is flush with the front panel of the chassis.
6. Secure the module to the chassis using the front-panel captive screws, shown in Figure 2. Tighten the screws to 0.31 N · m (2.7 lb · in.).




| | |
|---|---|
| 1 | Captive Screws |

**Figure 2.** Installing NI SC Express Modules

## Step 3. Connect the Signals

**Note** Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document before removing equipment covers or connecting or disconnecting any signal wires.

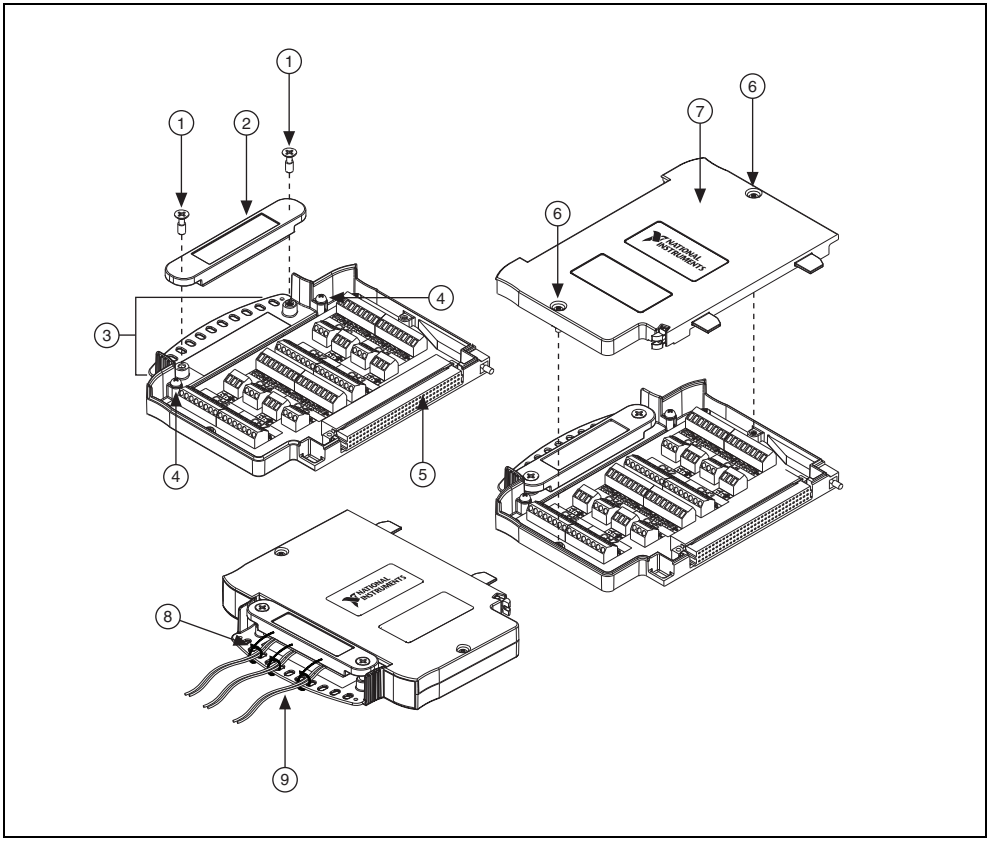
**Note** For EMC compliance, operate this product with shielded cables and accessories.

To connect signals to the terminal block, refer to Figures 3 and 4 while completing the following steps:

**Note** You can find the pinout names and locations in MAX at any time by right-clicking the device name under **Devices and Interfaces** and selecting **Device Pinouts**.

1. Loosen the captive top cover screws and remove the top cover.
2. Loosen the strain-relief screws and remove the strain-relief bar.
3. Prepare the signal wire by stripping the insulation no more than 7 mm (0.28 in.).

4. Run the signal wires through the strain-relief opening.




| | | | | | |
|---|---|---|---|---|---|
| 1 | Strain-Relief Screws | 4 | Ground Lugs | 7 | Top Cover |
| 2 | Strain-Relief Bar | 5 | Terminal Block to Module Connector | 8 | Tie Wraps |
| 3 | Tie Wrap Holes | 6 | Captive Top Cover Screws | 9 | Signal Wires |

**Figure 3.** TB-4330 Parts Locator Diagram

5. Insert the stripped end of the signal wires fully into the appropriate terminal. Refer to the label next to each screw terminal to determine the function of the terminal. The *NI PXIe-4330/4331 User Manual* provides more detailed wiring information. Make sure no exposed wire extends past the screw terminal. Exposed wire increases the risk of a short circuit that can cause circuit failure.

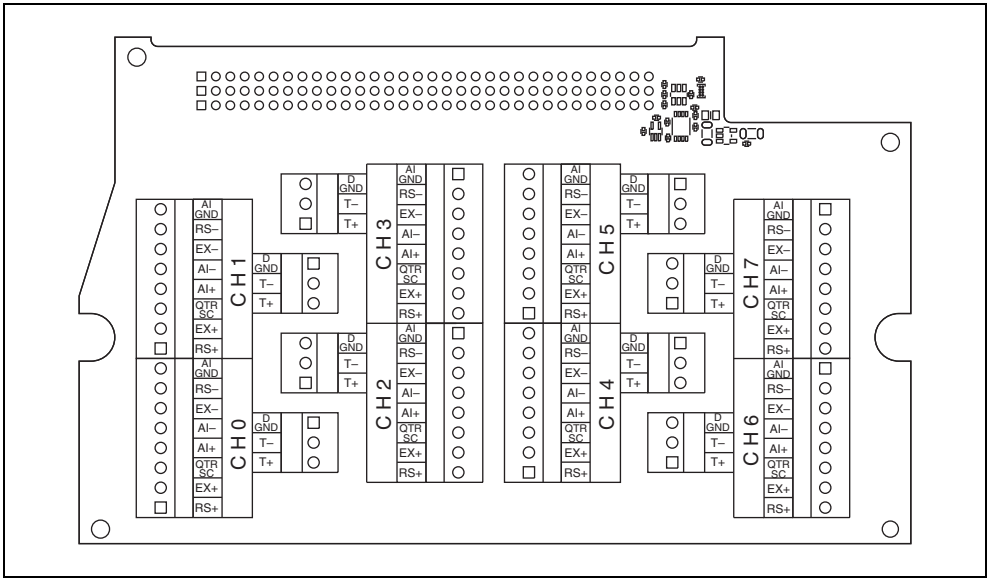



**Figure 4.** TB-4330 Circuit Board Parts Locator Diagram

6. Tighten the terminal screws to a torque of 0.57 to 0.79 N · m (5 to 7 lb · in.).

**Caution** Any wires connected to the ground must be sufficiently insulated from high voltage.

7. Use the ground lugs to attach a shield wire to the ground.

**Note** Refer to the *NI PXIe-4330/4331 User Manual* for details about shielding the signals.

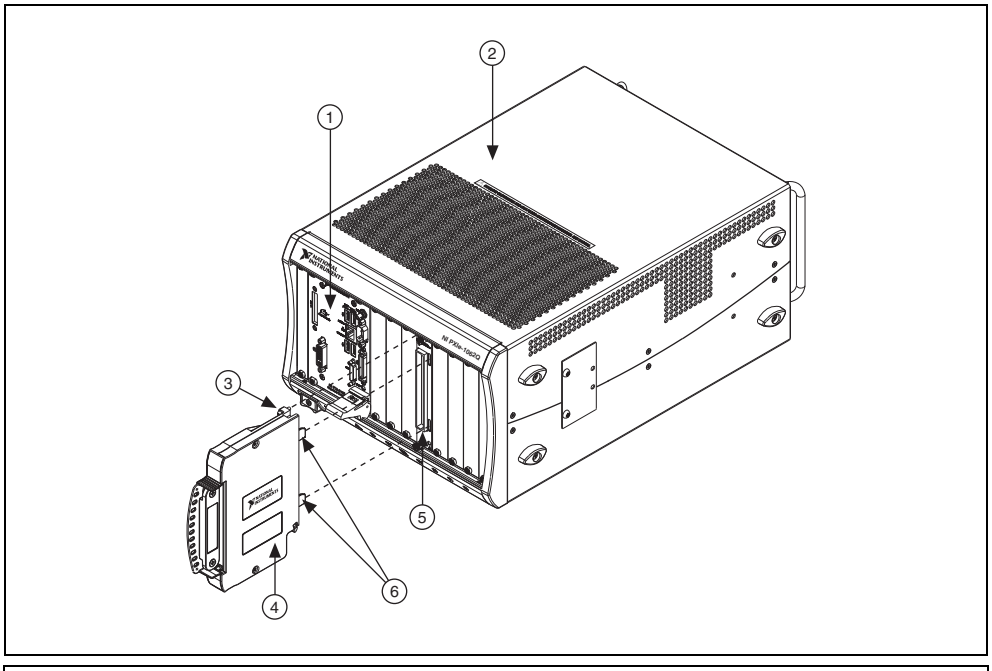
8. Reinstall the strain-relief bar and tighten the strain-relief screws.
9. Use tie wraps to connect the signal wires to the tie-wrap holes for additional strain relief when necessary.
10. Reinstall the top cover and tighten the captive top cover screws.

**Note** For information about sensors, go to `ni.com/sensors`.

## Step 4. Install the Terminal Block

Refer to Figure 5 to install the terminal block on the module while completing the following steps:

1. Move the TB-4330 into position in front of the NI PXIe-4330/4331 and engage the alignment feature with the guide on the associated module.




| | | | | | |
|---|---|---|---|---|---|
| 1 | NI PXIe Controller | 3 | Mounting Screw | 5 | NI PXIe-4330/4331 Module |
| 2 | NI PXIe Chassis | 4 | TB-4330 Terminal Block | 6 | Alignment Feature |

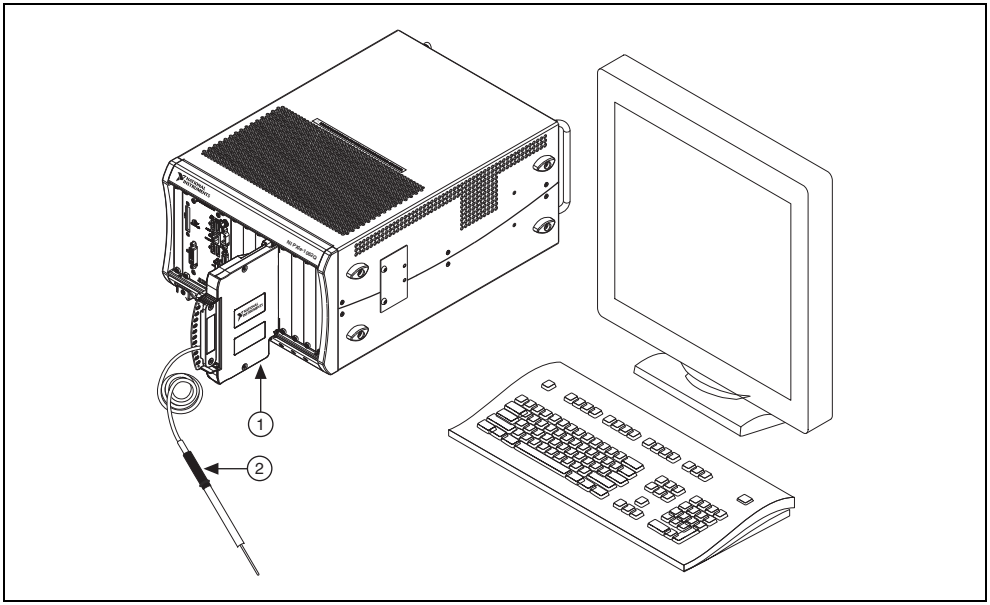
**Figure 5.** Installing the TB-4330 on the NI PXIe-4330/4331 Module

2. Attach the TB-4330 to the NI PXIe-4330/4331 module by pushing the terminal block straight into the module. A spring mechanism will lock in the bottom of the terminal block.
3. Tighten the mounting screw at the top of the TB-4330 to attach it to the NI PXIe-4330/4331 module.

**Note** For safety purposes and to prevent damage to equipment when high voltages are present, all NI SC Express modules and terminal blocks are keyed to prevent connection between incompatible terminal blocks, modules, and/or cables.

4. Power on the chassis.

Figure 6 shows an example NI SC Express system setup.




| | | | |
|---|---|---|---|
| 1 | Terminal Block | 2 | Signal Input |

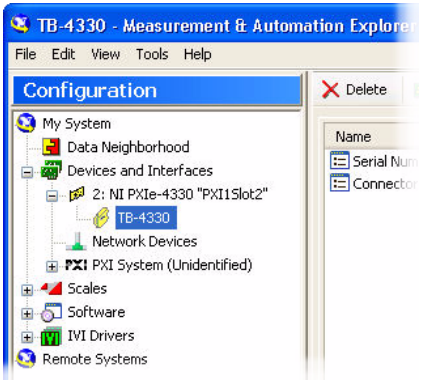
**Figure 6.** Sample NI SC Express System

## Step 5. Confirm NI SC Express Module Recognition

To confirm module recognition, complete the following steps:

**Note** Make sure you are using the most recent version of NI-DAQmx. If you are using an older version of the driver software, the NI SC Express terminal block may work only in basic functionality mode. Unsupported terminal blocks appear in Measurement & Automation Explorer (MAX) with an X next to them.

1. Launch MAX.
2. Expand **Devices and Interfaces**, and expand **NI-DAQmx Devices** to confirm that MAX detects the module and terminal block. The terminal block should appear beneath its associated module. If your module or terminal block is not listed, press <F5> to refresh MAX. If the module is still not recognized, go to `ni.com/support/daqmx`.



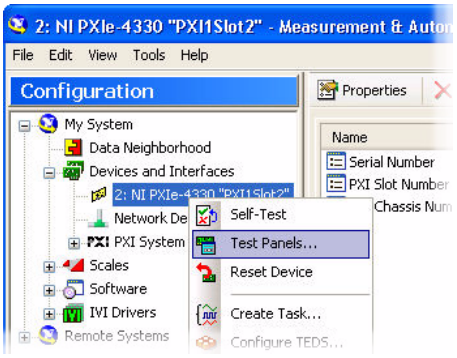

**Tip** Using an NI-DAQmx simulated device, you can test NI-DAQmx applications without installing hardware. Refer to the *Create a Simulated Device* section for instructions for creating NI-DAQmx simulated devices.

3. Right-click the module name and select **Self-Test**. When the self-test completes, a verification message appears. If an error occurs, refer to `ni.com/support/daqmx`.

For information about sensors, go to `ni.com/sensors`.

## Step 6. Run Test Panels

1. In MAX, expand **Devices and Interfaces»NI-DAQmx Devices**.
2. Right-click the device, and select **Test Panels**.




3. Click **Start** to test device functions, or **Help** for operating instructions.

To troubleshoot errors, refer to the *NI-DAQmx Help*, or go to `ni.com/support`.

## Step 7. Take an NI-DAQmx Measurement

### NI-DAQmx Channels and Tasks

Refer to the *NI-DAQmx Help* for complete information about channels and tasks.

Use the DAQ Assistant to configure virtual channels and tasks in MAX or in your application.

### Configure a Task Using the DAQ Assistant from MAX

Complete the following steps to create a task using the DAQ Assistant in MAX:

1. In MAX, right-click **Data Neighborhood** and select **Create New** to open the DAQ Assistant.
2. Select **NI-DAQmx Task** and click **Next**.
3. Select **Acquire Signals**.

**Note** The NI PXIe-4330/4331 cannot generate signals.

4. Select the analog input, and the measurement type, such as strain.
5. Select the physical channel(s) to use and click **Next**.
6. Name the task and click **Finish**.
7. Configure the individual channel settings. Each physical channel you assign to a task receives a virtual channel name. To modify the input range or other settings, select the channel. Click **Details** for physical channel information. Configure the timing and triggering for your task. Click **Run**.

## Step 8. Use Your NI SC Express in an Application

For NI software version compatibility, refer to the NI-DAQmx Readme, available from **Start» All Programs»National Instruments»NI-DAQmx**.

To get started with data acquisition in your application software, refer to the tutorials listed in Table 1.

**Table 1.** DAQ Assistant Tutorial Locations

| Application | Tutorial Location |
|---|---|
| LabVIEW | Go to **Help»Search the LabVIEW Help**. Next, go to **Getting Started with LabVIEW» Getting Started with DAQ»Taking an NI-DAQmx Measurement in LabVIEW**. |
| LabWindows/CVI | Go to **Help»Contents**. Next, go to **Using LabWindows/CVI»Data Acquisition»Taking an NI-DAQmx Measurement in LabWindows/CVI**. |
| Measurement Studio | Go to **NI Measurement Studio Help»Getting Started with the Measurement Studio Class Libraries»Measurement Studio Walkthroughs»Walkthrough: Creating a Measurement Studio NI-DAQmx Application**. |
| LabVIEW SignalExpress* | Go to **Help»Taking an NI-DAQmx Measurement in SignalExpress**. |
| * LabVIEW SignalExpress, an easy-to-use configuration-based tool for data logging applications, is at **Start»All Programs»National Instruments»LabVIEW SignalExpress**. | |

### Programming Examples

NI-DAQmx includes example programs to help you get started developing an application. LabVIEW and CVI examples are located at **Help»Find Examples** in your application software. Text-based code examples are located at **All Programs»National Instruments»NI-DAQ»Text-Based Code Support»ANSI C Examples**. Modify example code and save it in an application, or use examples to develop a new application or add example code to an existing application.

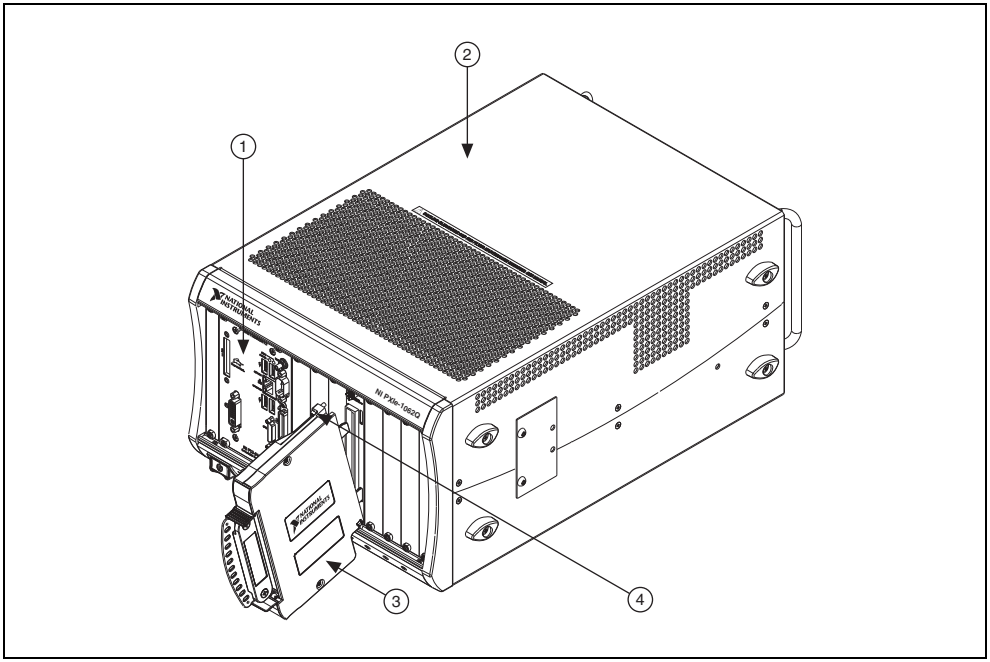
For other examples, go to `ni.com/info` and enter the info code `daqmxexp`. For additional examples, refer to `zone.ni.com`.

## Removal

### Step 1. Remove the Terminal Block

Refer to Figure 7 to remove the terminal block from the module while completing the following steps:

1. Power off chassis before removing the terminal block.
2. Loosen the terminal block captive screw located at the top of the terminal block.
3. Tilt the terminal block down and away from the module to disengage the guides.
4. Grasp the terminal block and pull it away from the module.
5. Store the terminal block in an antistatic protective bag.




| | | | |
|---|---|---|---|
| 1 | NI PXIe Controller | 3 | TB-4330 Terminal Block |
| 2 | NI PXIe Chassis | 4 | Mounting Screw |

**Figure 7.** Removing the TB-4330 from the NI PXIe-4330/4331 Module

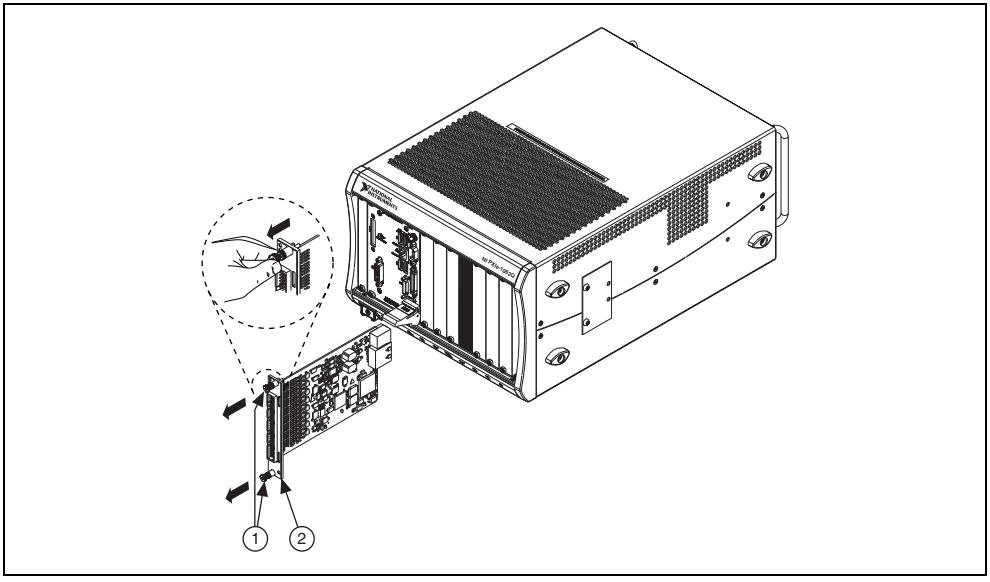
## Step 2. Remove the Module

**Caution** Do *not* remove a module with the power on. Doing so can damage the module.

1. Make sure that the chassis is powered off before removing the module.
2. Loosen the captive screws on the top and bottom of the module.

**Caution** Do *not* pull the front panel to remove the module. Doing so may cause module components to come into contact with adjacent modules, causing damage to the modules.

3. Pull the captive screws to unseat the module and slowly slide the module along the guides, as shown in Figure 8.
4. Replace the filler panel in the empty slot.
5. Store the module in an antistatic protective bag.




| | | | |
|---|---|---|---|
| 1 | Captive Screws (Use to remove modules.) | 2 | Front Panel (Do not use to remove modules.) |

**Figure 8.** Removing NI SC Express Modules

## Create a Simulated Device

To run examples without the hardware installed, use an NI-DAQmx simulated device. To create a simulated device in MAX:

1. Launch MAX.
2. Right click **Devices and Interfaces»Create New**.
3. From the dialog, select **Simulated NI-DAQmx Device or Modular Instrument**.
4. Type `4330` or `4331` in the text box at the top of the window.
5. Select the device from the list provided.
6. Click **OK**.

## Calibrating the Terminal Block

The TB-4330 terminal block does not require calibration. Refer to the *NI PXIe-4330/4331 User Manual* for information regarding module calibration.

## More Information

After you install NI-DAQmx, the NI-DAQmx documentation is available from **Start»All Programs» National Instruments»NI-DAQ**. Additional resources are online at `ni.com/gettingstarted`.

You can access online device documentation by right-clicking your module in MAX and selecting **Help»Online Device Documentation**. A browser window opens to `ni.com/manuals` with the results of a search for relevant documents. If you do not have Web access, documents for supported modules are included on the NI-DAQmx disc.

### Troubleshooting

- Go to `ni.com/support/install` or `ni.com/kb`.
- If you need to return your National Instruments hardware for repair or device calibration, go to `ni.com/info` and enter `rdsenn` to start the Return Merchandise Authorization (RMA) process.

## Worldwide Technical Support

For support information, refer to the *Technical Support Information* document available at `ni.com/manuals`. Also visit `ni.com/support` or `ni.com/zone`. For support available at the National Instruments worldwide offices, visit `ni.com`. National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504.

## Specifications (TB-4330)

**Note** NI PXIe-4330/4331 module specifications are located in the *NI PXIe-4330/4331 Specifications* document.

All specifications are typical at 23 °C unless otherwise specified.

### Electrical

Trace resistance (screw terminal to connector)
QTR, EX+, EX–.....<20 mΩ

### Mechanical

Screw terminal wire gauge.....14 AWG, max

## Physical

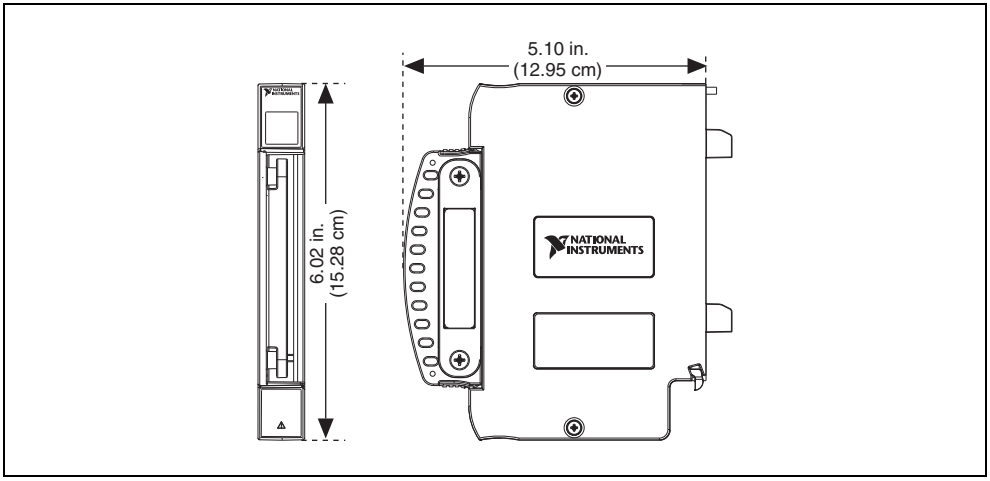



**Figure 9.** TB-4330 Dimensions

Weight .....548 g (19.3 oz)

## Environmental Specifications

Maximum altitude.....2,000 m (800 mbar), at 25 °C ambient temperature

Pollution Degree .....2

Indoor use only

### Operating Environment

Ambient temperature range .....0 to 55 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range.....10% to 90%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

## Storage Environment

Ambient temperature range .....–40 to 71°C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)

Relative humidity range.....5% to 95%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

## Shock and Vibration

Operating shock .....30 g peak, half-sine, 11 ms pulse
(Tested in accordance with IEC-60068-2-27.
Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

Operating .....5 to 500 Hz, 0.3 $g_{rms}$

Non-operating .....5 to 500 Hz, 2.4 $g_{rms}$
(Tested in accordance with IEC-60068-2-64.
Non-operating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

## Safety

Measurement Category .....I

**Caution** Do *not* connect the TB-4330 to signals or use for measurements within Measurement Categories II, III or IV.

## Safety Standards

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

**Note** For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

## Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

**Note** For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

**Note** For EMC compliance, operate this product with shielded cables and accessories.

## CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

## Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

## Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

### Waste Electrical and Electronic Equipment (WEEE)

**EU Customers** At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

### 电子信息产品污染控制管理办法 （中国 RoHS）

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